T03D03 – (3.3) Chemical Properties

Name…….

1. 3.3.1 Discuss the similarities and differences in the chemical properties of elements in the same group. (3)
   a. Properties down the Alkali Metals:

Element	Lithium	Sodium	Potassium
Electron Arrangement	2,1	2,8,1	2,8,8,1
Electron Configuration	$1s^2\ 2s^1$	$1s^2\ 2s^2\ 2p^6\ 3s^1$	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$
Chemical Symbol	Li	Na	K
First I.E. (kJ mol^{-1})	519	494	418
Atomic Radius (nm)	0.152	0.186	0.231
Melting Point (K)	454	371	337
Boiling Point (K)	1600	1156	1047
Density (g cm^{-3})	0.53	0.97	0.86
Standard Electrode Potential (E^o)	-3.03	-2.71	-2.92

   i. Chemical Properties of sodium:

      1. Write an equation for sodium's reaction in air:

      2. Write an equation for the reaction of sodium in water:

         a. Write an equation for the reaction of sodium hydroxide in water:

      3. Write an equation for sodium burned in the presence of chlorine gas:

   ii. Chemical Properties of potassium:

   iii. Chemical Properties of lithium:

   b. Properties down the Halogens:

Element	Chlorine	Bromine	Iodine
Chemical Formula	Cl_2	Br_2	I_2
Structure	Cl-Cl	Br-Br	I-I
Electron Arrangement	2.8.7	2.8.18.7	2.8.18.18.7
Noble Gas Notation	$3s^2\ 3p^5$	$4s^2\ 4p^5$	$5s^2\ 5p^5$
State at S.T.P.	Gas	Liquid	Solid
Color	Green	Red-brown	Black
Melting Point (K)	172	266	387 (458 Sublime)
Boiling Point (K)	239	332	----
Standard Electrode Potential (E^o)	1.36	1.09	0.54

i. Explain the general reactivity of Halogens:

1. Displacement Reactions
    a. In reactions, how can halogens become more stable? What determines which halogens will be able to achieve this stability?

    b. Write a set of equations to demonstrate the reactivity of halogens (ie, who replaces who):

2. Halide ion Reactions:
    a. What is a halide?

    b. How can you distinguish a halide from his counterpart halogen?

    c. How can you distinguish between the four halides of F^-, Cl^-, Br^-, and I^-

    d. Write an equation (noting the color and precipitate) for each of the sodium halides and silver nitrate:

2. 3.3.2 Discuss the changes in nature, from ionic to covalent and from basic to acidic, of the oxides across period 3. (3)
    a. Acid Base Character of Oxides:
        i. Metallic Oxides tend to be **ionic and basic**, write an equation for each:

        ii. Metaloid Oxides (such as Aluminum) **react with both acids and bases**. They are known as **amphoteric**, Provide an equation for aluminium behaving as an acid and another as a base.

        iii. Non-metal Oxides are **covalent and acidic**, write an equation for each:

        iv. So, what is the trend in oxides acidic nature as you go across a period?

    b. Explain why rain is naturally acidic:

    c. Explain how rain can become even more acidic: